A NOTE ON *"PETTANCYLUS" AUSTRALICUS* (Tate).

By BENGT HUBENDICK, D.Sc.*

Some years ago, Miss L. M. Angel, of the Department of Zoology, University of Adelaide, kindly sent me a sample of *"Pettancylus" australicus* (Tate, 1880, p. 102, pl. 4, fig. 4a-b) from the Torrens River, South Australia. The sample contained 168 specimens. One sectioned specimen appeared to be aphallic. Subsequent examination by transparent light revealed that aphaly is the normal state in this species or at least in the population examined. Only ten of the 168 species appeared probably to be phallic by this preliminary examination. Checking by serial sectioning showed that only seven specimens in the total sample had a complete reproductive system. These conditions add to the interest of the species, and a general morphological account of it may be of some value. This account is based on the intact specimens of the sample, nine serially sectioned specimens, and radula mounts.

The shell (Text figs. 1-3) reaches a maximum length of 3.8 mm. in the material examined. The corresponding maximum breadth is 2.2 mm., and height 1.0 mm. The size proportions vary slightly. The apex is smooth, but at a magnification of 50x a faint radial sculpture is sometimes visible on the apical region. The apex is located near the right side of the shell and about ¼-⅙ of the shell length from its rear end. The location of the apex and the morphology of the body indicates a vestigial pseudodextral shell. The anterior end of the shell is bluntly rounded, the posterior end somewhat more pointed, and located to the left of the median line. An extremely faint concentric sculpture is present. The transparent periostracum reaches well beyond the calcareous shell border. The colour of the shell is pale yellowish-brown.

One of the 168 specimens is septate (Text figs. 2-3), having the posterior part of the aperture closed by a septum of complete shell material. Some authors have regarded this feature as being of taxonomic importance, whereas others have regarded it as a kind of ecophenotypical adaptation (cf. Basch's review of the problem, 1959). The present case of septation does not support any of these views.

As in ancylids in general, the eaves-like mantle border runs all around the animal. The foot has a somewhat rectangular sole. The tentacles are slender but not sharply pointed. A rather thin, unbranched but slightly folded pseudobranch is present. The anterior end of this gill is thicker and the anal pore is located on its dorsal surface. The mantle opening, the excretory pore and the genital pores are also on the left side of the animal.

There are three strong so called shell adductors (text fig. 5), one on either side anteriorly and one posteriorly to the left. Between the two left adductors is the shallow, widely open mantle cavity. Above the anteriorly located main portion of this is part of the pericardium, which reaches further to the right. A narrow reno-pericardial duct connects the lumen of the pericardium with that of the kidney. This has a

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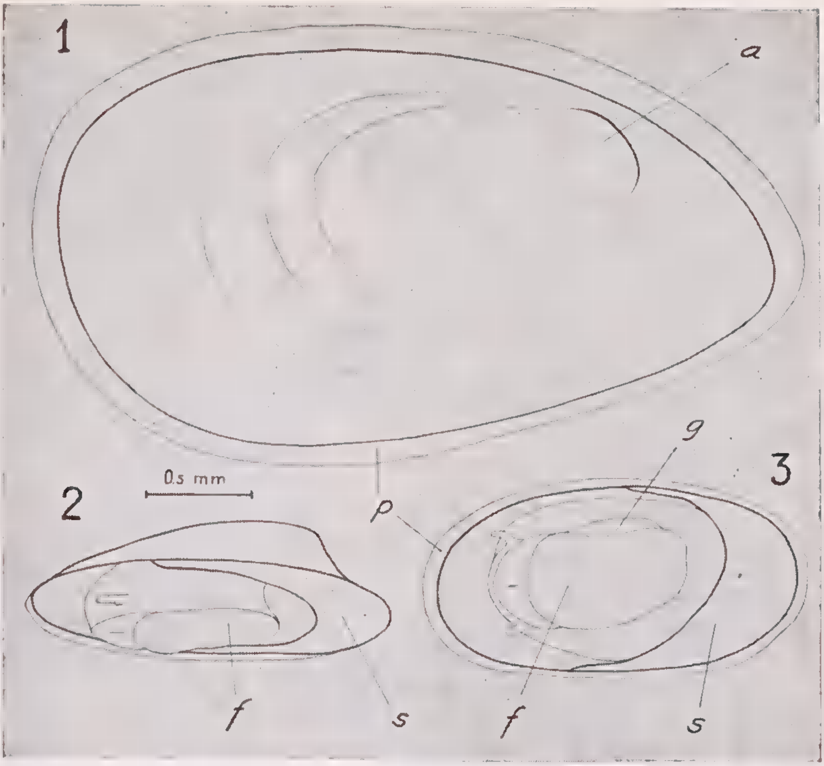

Text figs. 1-3.

"*Pettancylus*" *australicus* (Tate).

1. Dorsal view of shell.

2. Oblique left side view of septate shell with animal.

3. Ventral view of same specimen as in fig 2.
a, apex. *f*, foot. *g*, pseudobranch. *p*, periostracal shell edge. *s*, septum.

sac-like proximal portion and a sausage-shaped distal portion, which continues directly in the almost equally long urethra. The renal pore near the posterior end of the urethra is extremely narrow, and opens out under the mantle border. The kidney and the urethra form together a serpentine duct. The junction between its two elements is at the bend near the left posterior corner of the pericardium.

An osphradium is located in the mantle furrow near the left anterior shell adductor.

The jaw consists of a single row of separate chitinous condensations along the anterior and lateral sides of the mouth. The number of such chitin bars is about 75.

The buccal bulb occupies the major part of the head. The salivary glands (text fig. 6) are comparatively short and joined behind above the oesophagus. Their ducts are slender. The radula sac is short. The radula (text fig. 4) has about 27 teeth per cross row. The central tooth is symmetrical and has six cusps; of these the two central ones predominate, the more peripheral cusps are small and the most peripheral ones are visible only when the tooth is dislocated. The lateral teeth have up to eleven cusps. The four most peripheral teeth may be regarded as marginals, although a real distinction between laterals and marginals does not exist.

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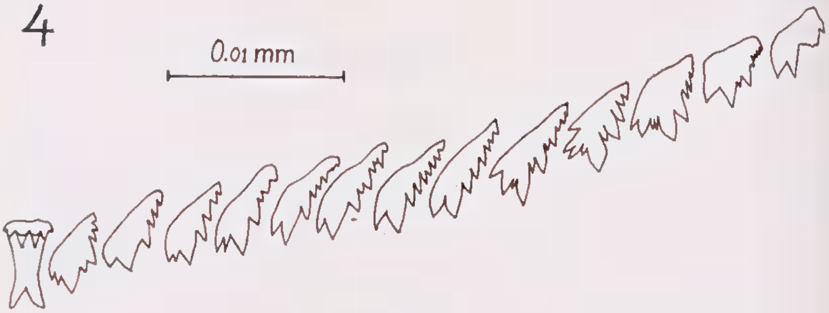


Text fig. 4.
"Pettancyclus" australicus (Tate).
Half a cross row of the radula.

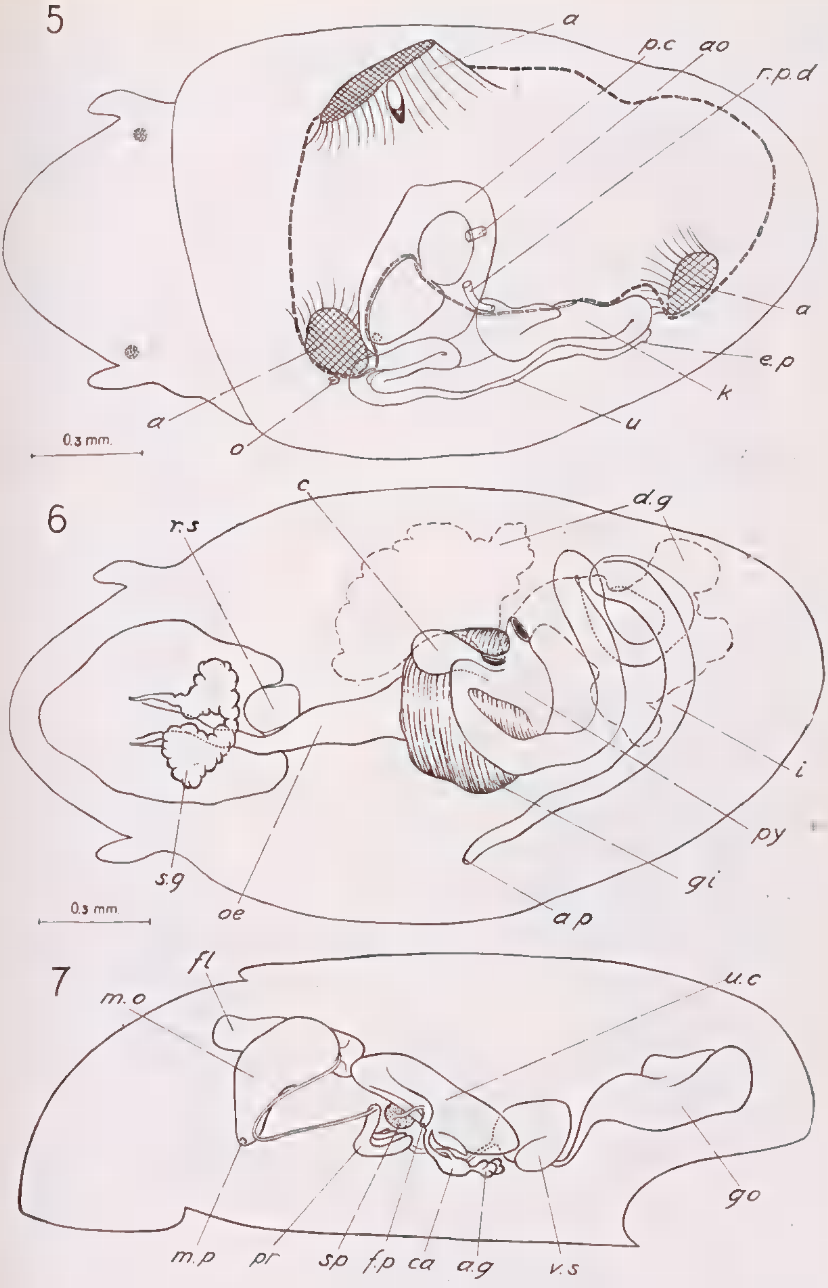
The oesophagus increases slowly in width behind the buccal bulb. There is no crop, but the oesophagus joins directly the well-developed gizzard. The pylorus region of the stomach adheres to the dorso-posterior side of the gizzard. The two independent, richly branched complexes of the digestive gland are connected with the pylorus. From this, near the pore of the anterior gland complex, a well-developed coecum branches off from the pylorus. The intestine leaves the pylorus parallel with the coecum and makes two loops before merging into the rectum. This runs towards the middle portion of the left side of the body. The anal pore is situated in the pseudobranchial fold.

Text figs. 5-7.

"Pettancyclus" australicus (Tate).

5. Diagram of adductor muscles and pallial organs, Dorsal view. The line of small rectangles represents the mantle cavity and the junction between the mantle border and the main body.
6. Diagram of the alimentary tract. Dorsal view. The fine broken lines indicate the outline of the digestive glands.
7. Diagram of the reproductive system, viewed from the left.

a, adductor muscles. *a.g.*, albumen gland. *ao.*, aorta. *a.p.*, anal pore. *c.*, caecum. *ca.*, carrefour. *d.g.*, digestive glands. *e.p.*, excretory pore. *fl.*, flagellum. *fp.*, female genital pore. *gi.*, gizzard. *go.*, gonad. *i.*, intestine. *k.*, kidney. *m.o.*, male copulatory organ. *m.p.*, male genital pore. *o.*, osphradium. *o.e.*, oesophagus. *p.c.*, pericardium. *pr.*, prostate. *py.*, pylorus. *r.p.d.*, reno-pericardial duct. *r.s.*, radula sac. *s.g.*, salivary gland. *sp.*, spermatheca. *u.*, urethra. *u.c.*, uterine gland complex. *v.s.*, vescular seminalis.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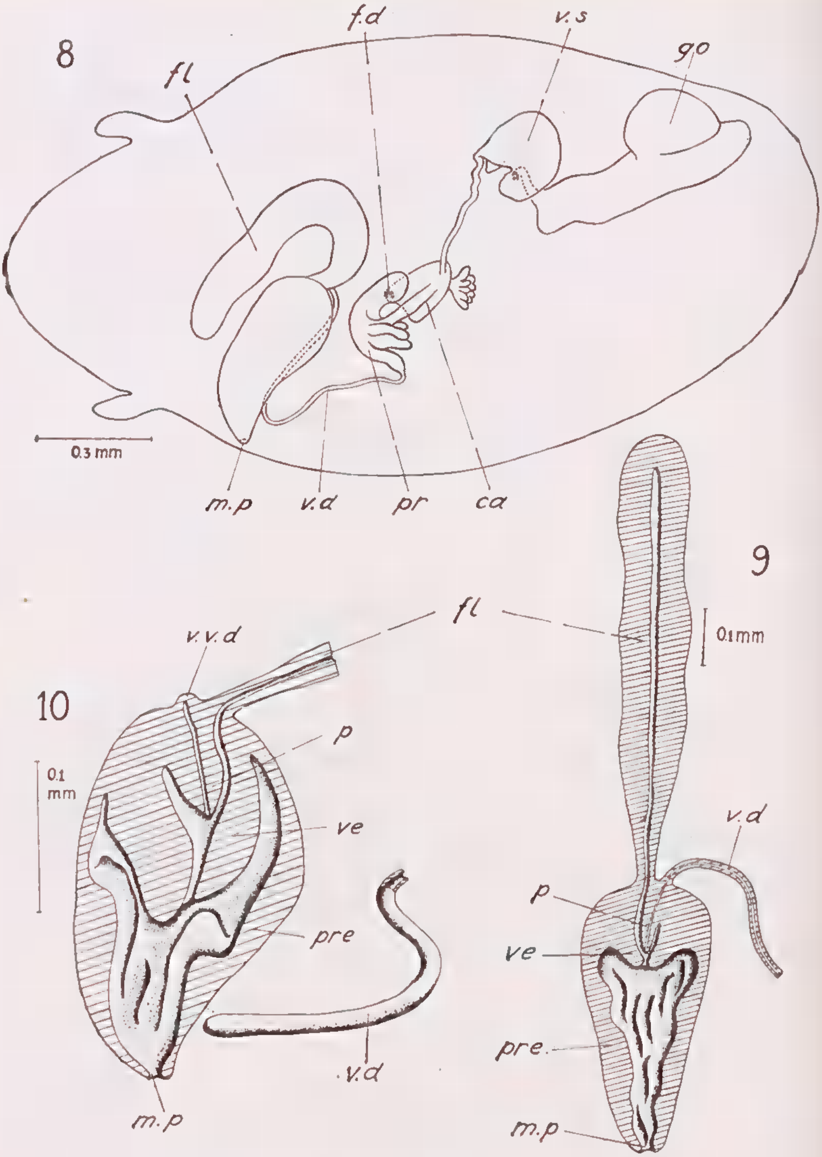
Text figs. 5-7.



Text figs. 8-10.

"*Pettancylus*" *australicus* (Tate).

8. Diagram of genital system, distal female componants removed: dorsal view.
9. Diagram of longitudinally sectioned male copulatory organ with flagellum.
10. Diagram of longitudinally sectioned incomplete male organ. Cut surfaces parallely ruled.

ca., carrefour. *f.d.*, beginning of female duct. *fl.*, flagellum. *go.*, gonad. *m.p.*, male genital pore. *p.*, penis. *pr.*, prostate. *pre.*, preputium. *v.d.*, vas deferens. *ve.*, velum. *v.s.*, vesicula seminalis. *v.v.d.*, vestige of vas deferens.

The apically located gonad is bifurcated only (text figs. 7-8). In its uppermost parts only eggs are formed, in its lower parts both eggs and spermatozoa. The efferent duct leads to a rather large, thin-walled vesicula seminalis. From there the common duct runs to the carrefour. The albumen gland also joins this structure. From the carrefour the separate male and female ducts go off, the former to the prostate, the latter to the uterine gland complex. The prostate has around five diverticula branching off from a swollen portion of the male duct. The latter continues as the vas deferens to the male copulatory organ, which it enters parallel with the large glandular flagellum. The male organ is not externally divided in a penis sheath and a preputium, but internally there is a dividing velum formation (text fig. 9). The penis is small and has a terminal pore. The lumen of the flagellum continues in the proximal end of the lumen of the penis sheath. In the preputium there are no real muscular pillars, but irregular fold formations. The male genital pore is situated behind the left tentacle.

The large uterine gland complex merges, at its anterior end, into the slenderer structure which, after joining the thin spermathecal duct, leads to the female pore. This is located on a small papilla below the anterior end of the pseudobranchial flap. The spermatheca is roundish and of moderate size.

In the central nervous system the cerebral and pleural ganglia are fused on either side. This fusion is particularly intimate on the right side. The visceral commissure has three ganglia, of which the middle and left ones are rather diffusely delimited from each other. The pedal commissure is comparatively thin. Behind this is a very slender parapedal commissure.

Before ending this brief description of the topographic morphology in *Pettancylus australicus,* a further note on the aphally and related conditions in this species may be worth while. As mentioned above, the vast majority of the specimens in the sample examined are aphallic. Serial sections of one of these specimens show that even here both eggs and spermatozoa are formed in the gonad. Apart from the male copulatory organ also the vas deferens is missing. The prostate is strongly reduced. Of the phallic specimens eight were serially sectioned. In seven of these both eggs and sperm cells were present in the gonad, whereas in the eighth the whole gonad was degenerated. Another sectioned specimen, finally, showed a sort of intermediate state between the phallic and aphallic condition. In this specimen the whole male copulatory organ was present, but the distal portion of the vas deferens absent (text fig. 10). A little knob on the proximal end of the male copulatory organ indicates the place where the vas deferens should have entered. The remaining distal part of the vas deferens was somewhat swollen, thin-walled and full of spermatozoa. In the same specimen certain parts of the uterine gland complex showed an enormous hypertrophy.

The species under consideration was originally described by Tate as *Ancylus australicus.* The type species of *Ancylus, A. fluviatilis* Müller, is, however, anatomically different to an extent that justifies generic discrimination. Iredale (1943) placed the species in his genus *Pettancylus.* However, this genus has never been defined, and its type species, *P. tasmanicus* (Ten.-Woods) has not been anatomically examined. Iredale separated the "southern" ancylids from *Ferrissia* without any appropriate reason. *"Pettancylus" australicus* has a male copulatory organ which is similar to that of the Indian *Ferrissia tenuis* (Bourguignat) (Hubendick, in press) and probably similar to those of *F. tarda* (Say) (Hoff 1940) and *F. parallela* (Haldeman) (Baker 1928), although differences occur in other organs. However, the type species of *Ferrissia* is *F. rivularis* (Say), and according to my own tentative examination the male copulatory organ is here distinctly different from those in the above-mentioned species. The conclusion to be drawn from this is that it is too early to settle the taxonomic classification of *"Pettancylus" australicus.* The same is true for most ancylids, and the author is slowly collecting information which will enable him to revise the taxonomy of the Ancylidae.

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